COUNTY OF LOS ANGELES
Public Health

CYNTHIA A. HARDING, M.P.H.
Interim Director

JEFFREY D. GUNZENHAUSER, M.D., M.P.H.
Interim Health Officer

313 North Figueroa Street, Room 708
Los Angeles, California 90012
TEL (213) 240-8156 • FAX (213) 481-2739

www.publichealth.lacounty.gov

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TO: Each Supervisor

FROM: Cynthia A. Harding, M.P.H.
Interim Director

SUBJECT: **USE OF SEAT BELTS IN PUBLIC TRANSPORTATION (Motion 79-A)**

This is in response to the June 2, 2015 Board motion by Supervisor Antonovich directing the Department of Public Health (DPH) to provide a report on: 1) the safety benefits of requiring the installation and use of seat belts in public transportation, including school buses, trains and subways; and 2) State legislation pertaining to the use of seat belts in school buses.

Introduction

From 2007 to 2011, 8 people died and 1,925 people were injured in collisions while riding on mass transit in Los Angeles County. Over the same five year period, there were 3,193 deaths and 378,858 injuries due to motor vehicle collisions. For motor vehicle collisions in which a driver was driving under the influence of alcohol (DUI), 391 people died and 24,659 people were injured (2007 to 2011).[1] The data indicates, and studies have shown, mass transit is often the safer option compared to motor vehicles.

While we know that lap and shoulder (three-point) seat belts significantly reduce fatalities and serious injuries in automobiles, the National Highway Traffic Safety Administration (NHTSA), the National Transportation Safety Board (NTSB) and the National Academy of Sciences (NAS) have determined that the best way to provide crash protection to passengers of larger vehicles such as trains, subways and school buses over 10,000 pounds, is through compartmentalization.

Compartmentalization has been used for more than 30 years in transportation to provide protection in frontal or rear impact crashes for unbelted passengers. Required by federal regulation for buses, compartmentalization provides protection for unbelted occupants through the use of high-back padded seats, which are designed to yield as they are impacted.

Research findings and benefits regarding the use of seat belts, used alone or in conjunction with compartmentalization and other safety measures, vary by mode of transportation and are described below.

[1] California Highway Patrol, Statewide Integrated Traffic Records System (SWITRS), 2007-2011.

School Buses

In the last 10 years there have been no passenger fatalities within Los Angeles County on school buses.[2]

The NTSB, through a series of crash investigations, determined that compartmentalization, as a method of occupant protection on school buses is incomplete. Compartmentalization does not provide protection during lateral (side) impacts with school buses or in rollover collisions, because passengers do not always remain completely contained within the compartment. The NTSB recommends the development and implementation of a seat and restraint system that restrains passengers in the seating compartment as well as compartmentalization to absorb crash energy.

The Department of Public Health (DPH) concurs with the recommendation by the National Transportation Safety Board (NTSB), that school buses implement seat and restraint systems that restrain school bus passengers in the seating compartment and use compartmentalization to absorb crash energy. DPH also agrees with the American Academy of Pediatrics' recommendation that all children travel in age-appropriate, properly secured child-restraint systems when transported in all motor vehicles, including school buses, to ensure the safest ride possible.[3] Last, DPH recommends collaborating with school districts to support the education and training of administrators, students, teachers, drivers, and parents on the proper use of occupant-protection devices.

Commuter Trains and Light Rail

From 2005-2012, there were 9 fatalities and 414 injuries on commuter trains and light rail in Los Angeles County.[4]

In 1999 the U.S. Department of Transportation, Federal Railroad Administration (FRA) administered a full-scale test of a single rail passenger car colliding with a fixed wall at 35 miles per hour to obtain scientific data on the corresponding level of occupant safety. They concluded that a modified seat with lap and shoulder belt performed well under frontal impact loads. This modified seat included a stronger seat and wall/floor mounts than current rail seats.

More recently a British study from 2007 studied the potential effectiveness of three-point belts on modified train seats (using sled tests, dummies, and computer modeling) upon reviewing six significant collisions. The final report found that injury outcomes of passengers wearing seat belts were substantially better when compared to the injury outcomes of unrestrained passengers. However, three-point seat belts were not recommended for the following reasons: 1) the benefit of seat belts would only be marginal relative to having a crashworthy seat designed to meet current standards; 2) they are not suitable for infants and children; 3) passengers restrained in areas of structural intrusion (objects penetrating windows during derailment) are likely to be more severely injured than unrestrained passengers, who are usually thrown clear as the intrusion progresses; and 4) current seat designs are not suitable for installing seat belts. They

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[2] Statewide Integrated Traffic Records System, California Highway Patrol. Injuries to Bus Passengers Due to Traffic Collisions in Los Angeles County, 2012. Prepared by Los Angeles County Department of Public Health, Division of Chronic Disease and Injury Prevention, Injury and Violence Prevention Program, June 1, 2015.

[3] Pediatrics. Vol. 120, No. 1 July 2007, p. 213-220. Access at http://pediatrics.aappublications.org/content/120/1/213.full.pdf+html

[4] Hospital Discharge and Emergency Department Data, Office of Statewide Health Planning and Development Mortality Data, California Department of Health Services, Center for Health Statistics. Prepared by Los Angeles County Department of Public Health, Division of Chronic Disease & Injury Prevention, Injury and Violence Prevention Program, June 1, 2015.

concluded that efforts and budget should be better spent on increasing the strength of the window glass to improve the containment of passengers to offset injuries and fatalities caused by ejection.[5]

Similar concerns about structural intrusion in various crash scenarios, and increased injuries to unrestrained or incorrectly restrained passengers has generally led researchers to discourage the use of seat belts in trains and to focus costs on other aspects of the train structure (e.g. more padding for better compartmentalization of passengers with modified seat and mounting to increase crash survivability).

DPH concurs with the recommendations of Britain's Rail Safety & Standards Board that 3-point passenger restraints should not be fitted to trains for the following reasons: they would do minimal good, that the harm caused would be greater than any safety benefits, and that the cost of retrofitting three-point seat belts to current train seats would be high. DPH encourages safety improvement for trains be focused on purchasing new trains that have modified seat designs that meet industry standards and interior structure to handle crash survivability.[6]

Mass Transit Buses

During the last 10 years there have been 6 passenger fatalities and 3,888 mild-to-severe injuries of bus passengers within Los Angeles County.[7]

In 2012 the U.S. Department of Transportation (DOT) Federal Transit Administration (FTA) prepared a report evaluating five years of data on the crashworthiness of mass transit buses. It concluded that with proper compartmentalization design methods, the use of passenger restraint systems is not required to meet the injury criteria standard of the Federal Motor Vehicle Safety Standards (FMVSS).

DPH concurs with the FTA recommendation for high seatback and headrests to provide needed head and neck support to create proper compartmentalization for passengers. Further research is needed to determine the feasibility of adapting automotive child restraint systems for use in transit buses to address the current lack of child-specific injury protection.[8]

Motorcoaches

For many years, the motorcoach (i.e., private tour/transportation buses) industry has believed their vehicles provide compartmentalization protection. However within the motorcoach industry, the definition of compartmentalization has not included design requirements, performance standards and details such as maximum seat spacing, which are all clearly defined by FMVSS 222 for school buses. Due to many high profile collisions within the last 20 years, various governments enacted legislation for upper body restraints (lap-shoulder seat belts) in buses. Australia has required three-point seat belts in new coaches since 1994.[9] The European Union requires all new long distance buses and coaches to be fitted with seat belts since

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[5] Rail Safety & Standards Board Research Programme. "Assessment of Three-Point Passenger Restraints (Seatbelts) Fitted to Seats on Rail Vehicles." 2007. Access at http://www.railwaysarchive.co.uk/documents/RSSB_Seatbelts2007.pdf

[6] Ibid.

[7] Hospital Discharge and Emergency Department Data, Office of Statewide Health Planning and Development Mortality Data, California Department of Health Services, Center for Health Statistics. Prepared by Los Angeles County Department of Public Health, Division of Chronic Disease & Injury Prevention, Injury and Violence Prevention Program, June 1, 2015.

[8] Olivares, G. "Crashworthiness Evaluation of Mass Transit Buses." Federal Transit Administration. Web. February 2012. Access at http://www.fta.dot.gov/documents/FTA_Report_No._0021.pdf

[9] Griffiths, M, Paine, M, Renae, M. "Three Point Seat Belts on Coaches—The First Decade in Australia." 19th International Technical Conference on the Enhanced Safety of Vehicles Transportation Research Information Database. June 2005.

2006.[10] In the United States, the National Highway Traffic Safety Administration (NHTSA) has now required lap-shoulder seat belts in new coaches starting 2016.[11]

DPH concurs with this requirement and has no further recommendation.

State Legislation

Currently, six states require seat belts on schools buses. They are California, Florida, Louisiana, New Jersey, New York, and Texas. California has the strongest policy on record that mandates all its school buses manufactured on and after July 1, 2004, be equipped with an upper body restraint.

In addition, all passengers riding in a California school bus equipped with seat belts must wear them, and students must receive age-appropriate instruction on the proper use of the seat belt. However, of California's 25,822 certified school buses, only 1,900, or 7.3%, have seat belts installed. More research is needed to assess the current status of seatbelts installed on the school bus fleet in Los Angeles County.

Summary

The current number of injuries and fatalities in Los Angeles County resulting from collisions while riding mass transit remains relatively low (1933 during the last 5 years). When compared to other types of traffic related injuries such as those resulting from driving under the influence, mass transit remains the safer option.[12] While the use of three-point seat belts, in combination with other safety measures and public education, remains one of the most effective ways to prevent deaths and injuries in all vehicular crashes, not all modes of mass transit benefit equally from the use of seat belts. In some instances, pcompartmentalization is the best and recommended safety mechanism. Additionally, research indicates that there is no net benefit to having seat belts retrofitted onto existing public transportation (school buses, trains and subways)—these vehicles were not designed to support seat belts and could cause additional injury.

In general, it is better to purchase newer, upgraded vehicles - buses, trains, motorcoaches - that holistically design protection features, including the interior structure, passenger seats and restraint systems together for maximum safety benefit. Safety upgrades and technological advancements, in combination with three-point seat belts that are age appropriate, and public education about proper seat belt use, are central to maximizing the public's safety when using mass transit.

If you have any questions or would like additional information, please let me know.

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c: Interim Chief Executive Officer
Interim County Counsel
Acting Executive Officer, Board of Supervisors

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[10] "EU law makes seat belts obligatory in long distance buses and coaches". European Public Health Alliance. 2006-07-19.
[11] Taylor, N. "NHTSA Announces Final Rule Requiring Seat Belts on Motorcoaches." Department of Transportation. Web. November 20, 2013. Access at http://www.nhtsa.gov/About+NHTSA/Press+Releases/NHTSA+Announces+Final+Rule+Requiring+Seat+Belts+on+Motorcoaches
[12] Statewide Integrated Traffic Records System, California Highway Patrol. Alcohol and Drug Involved Drivers in Fatal/Injury Crashes Without Record of Conviction by County and Impairment Level, 2011. Prepared by the California Department of Motor Vehicles, January 1, 2014.